



Packaging Standards for Spent Nuclear Fuel

Mission

Develop packaging standards for DOE-owned spent nuclear fuel

Benefits

- Minimizes the need for conservative packaging methods
- Reduces packaging costs
- Reduces radiological risks to people and the environment

Current Issues

Consensus standards are needed as soon as possible to support DOE operations

Project Status

Outline was drafted. Research is ongoing to support consensus standard development

Purpose

Packaging standards are needed to interpret transport, storage, and repository disposal requirements and to provide formal guidance on package acceptability to the U.S. Department of Energy (DOE) sites managing spent nuclear fuel. The standards provide guidance for packaging spent nuclear fuel in the standardized DOE spent nuclear fuel canister so that the package meets the requirements for transportation and placement in the national repository, even after extended interim storage.

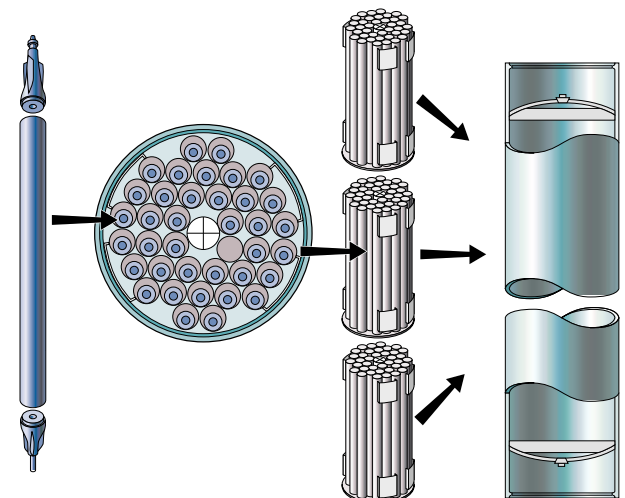
Project Description

The packaging standards development team is investigating the degradation factors that could affect the standardized DOE spent nuclear fuel canister during interim storage or transport. The team is developing methods to minimize that degradation. Using both “hot” (using radioactive material) and “cold” (using mock material) experiments, the methods are being validated as a means to minimize canister

degradation. Consensus standards will then be developed for use by the DOE sites in packaging their fuels destined for the national repository and to ensure the package will meet repository requirements for permanent emplacement.

DOE site packaging needs are being addressed through regular communication and coordinated research efforts. The packaging standards will address the following items:

- Fuel condition and foreign material
- Dryness (including drying process, pressurization management, corrosion management, hydrogen buildup management)
- Neutron attenuation and package internals
- Weight
- Loading
- Canister handling and closure
- Storage
- Package certification and overall documentation
- Remediation and corrective actions



A representation of how Training, Research, and Isotopic Reactors (built by General Atomics) fuel will be packaged for storage.



Benefits

Packaging standards will minimize conservative packaging measures including the use of exotic container material, special packaging, and extensive monitoring and mitigation procedures.

DOE spent nuclear fuel sites using the packaging guidance can avoid additional costs, risk, delays, and worker radiological exposure by limiting repackaging after interim storage.

Unique Capabilities

Extensive metallurgical and materials expertise is available through the National Spent Nuclear Fuel Program. These scientists and engineers are actively studying packaging issues such as corrosion, pressurization, and hydrogen buildup.

An example of their work is the research to mitigate hydrogen buildup. A hydrogen-permeable membrane will be tested. The membrane will vent excess hydrogen in the canister without venting other radioactive fission products or fine particles. The one-way membrane will prevent oxygen and moisture ingress and contact with the fissile material. This technology will contribute to safe, durable containment of spent nuclear fuel in the national repository.

Current Issues

Consensus standards are needed as soon as possible to support the DOE site operations schedules for spent fuel transfers from wet to dry storage.

Project Status

The primary degradation factors for the standardized DOE spent nuclear fuel canister have been identified. The project team is performing research on these degradation mechanisms and developing methods to prevent degradation. The packaging standards outline was drafted. Consensus standards will be incorporated as research is completed and data are available.



Laboratory picture of one-way hydrogen pressure relief membrane assembly.

Fiscal Year 2001

Communicate with DOE sites to identify user needs and to coordinate related research efforts

Continue investigation of degradation mechanisms and mitigation methods

Fiscal Year 2002

Define and validate research results

Issue draft packaging standard

Fiscal Year 2003

Issue final packaging standard

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